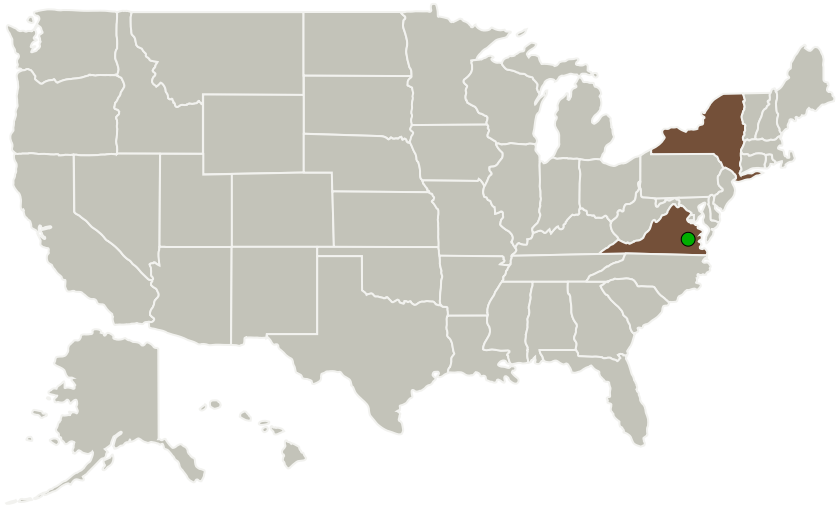
Laser Additive Manufacturing of Large Scale Polymer Matrix Composite Structures, Phase I

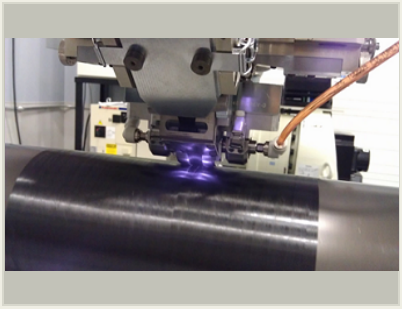
Completed Technology Project (2015 - 2015)

Project Introduction

A laser heating system (LHS) for the automated fiber placement (AFP) of thermoplastic composites (TPC) has recently been developed by Automated Dynamics to technology readiness level (TRL) three. This system represents the state of the art in out of autoclave, additive manufacturing of advanced polymer matrix composite (PMC) structures. It is particularly suited for manufacture of large scale structures as there is no oven or autoclave requirement while being compatible with a wide variety of thermoplastic polymers. Now that the prototype system has been developed, additional testing is required before it will be ready for production-level manufacturing. This proposal seeks to optimize and validate the Laser AFP process while advancing to TRL 4. This will be accomplished through coupon level mechanical testing to support predictable performance, development of additively manufactured tooling concepts to enable rapid development of structures with complex geometries, and a manufacturing demonstration of this effort embodied in a structure analogous to a pressure vessel.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Automated Dynamics	Lead Organization	Industry	Schenectady, New York
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
New York	Virginia

Project Transitions

June 2015: Project Start

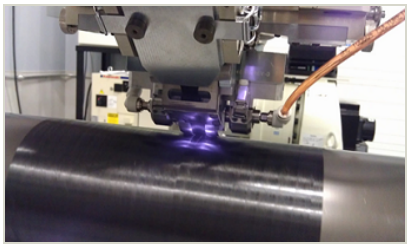
December 2015: Closed out

Closeout Summary: Laser Additive Manufacturing of Large Scale Polymer Matrix Composite Structures, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/139145)*

Images



Briefing Chart Image
Laser Additive Manufacturing of Large Scale Polymer Matrix Composite Structures, Phase I *(https://techport.nasa.gov/image/132094)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Automated Dynamics

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

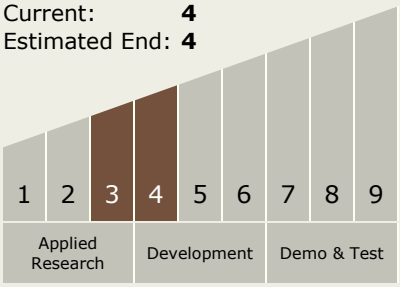
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Zachary August

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.1 Lightweight Structural Materials

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System